Reading Proposals Page 2

COMPUTERWORLD

The Newsweekly for the Computer Community

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Cobol Extensions Page 3

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Much Faster Crams, Disk Packs From NCR

Two direct access devices with greatly improved access times were the stars of the NCR Century computer line announcement. A new Cram unit and disk pack can be used on all computers in the line, although NCR has released only the two smallest systems. The line's software is almost completely operational. Deliveries start in September.

Multiprocessing and time sharing models are not presently included, although they are scheduled for future release.

All models in the entire Century series have on line, real time capabilities.

A full line of peripheral equipment including disk units, card readers, printers, magnetic tape handlers, and a new high capacity Cram (Card Random Access Memory) was also introduced by the company.

Greater Flexibility

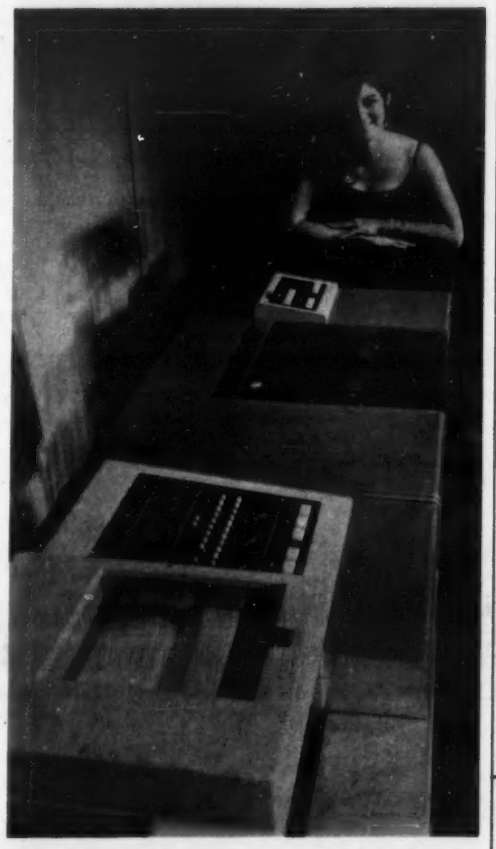
One of the most significant features of the Century series, according to NCR, is its great flexibility. This permits the user to modify and expand his system as his data processing needs change and grow.

NCR claims that the Century user can easily increase the capacity and power of the processor, add or combine a variety of peripheral devices, or move up to a larger basic system without costly reprogramming. Both software and hardware are compatible throughout the entire family.

The same basic memory module is used throughout. It operates at 800 nsec cycle time (800 billionths of a second) and is in the form of modules which can be expanded. The basic Century 100 has a memory of 16,000 characters which is expandable to 32,000. A Century 200 system can have a memory capacity of up to 524,000 characters.

High Capacity Storage

Every Century system includes two disk packs that provide fast, high capacity data storage and are used as a reservoir for the storage of operating software. This concept, similar to the successful Burroughs "System Disk," holds down core requirements when operating systems on computers are being used.



NCR's new Century Series computer. Punched card hopper and console are in foreground followed by dual-disc magnetic data storage unit, an integral part of every Century Series computer.

Each of the disks stores more than four million bytes of information. The average access time of 42 msec is unusually fast. Rate of data transfer is 108,000 bytes per second with a Century 100 and up to 180,000 with a Century 200.

The disks are unusual in that they are metal plated instead of oxide coated, providing an exceptionally clean and long wearing surface.

All Century computers use the international and American (ASCII) standard codes for information interchange.

Languages

The Century family has a wide repertroire of languages including Cobol, Fortran, and Neat/3. Cobol and Fortran will conform to USASI standards. These languages, as well as an extensive operating system, are made practical by the availability of random disk storage for all Century computers.

Questionnaire Programming

The operating system and, in particular, the new business oriented Neat/3 language simplify both the use and the programming of this new series. Special attention is given to large commonly used business data processing functions such as reporting and updating. Simple questionnaires are used when possible in place of a complex language syntax in order to simplify the communication between

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IEEE Honor For Dr. Grace Hopper

Dr Grace M. Hopper (right), nationally known for her original work in computer programming, receives the first Achievement Award given by the Philadelphia Section of the Institute of Electrical and Electronic Engineers for her "exemplary contributions to the science of computer technology," from Joseph E. Casey (left), chairman of the organization's Philadelphia group. Looking on (center) is Dr Seymour W. Herwald, IEEE national president. Event took place at the Philadelphia Chapter's Fellows and Past Chairmen's Night at the Marriott Motor Hotel. A staff scientist with Univac, Dr Hopper is also a Wave commander in the U.S. Naval [illegible] (retired). She is presently on [illegible] porary active duty for work [illegible] special assistant to the Sec[illegible] of the Navy. One of only two women to be elected as Fellows of the IEEE, Dr Hopper's award was the first ever made to a woman by the Philadelphia group.

New Group Forms

BOSTON – Businessmen who use computers can get leasing, consulting and education services from a corporation just formed here. Boston Computer Group, Inc., claims it can solve business problems as well as technical problems. Its management has a combination of technical, marketing, and administrative competence, according to Adolf Monosson, one of the group's three founders. Computer manufacturers reportedly have run into software problems with third generation machines. It is this type of problem that specialist firms like Boston Computer will tackle.

Tools Required First

AMA Told People Err, Not Systems

NEW YORK – The AMA Conference opened with its attendance down from last year's peak of 1200 to just under 1000. On the first day, the attendees heard Congressman Jack Brooks talking about the mistakes made by human beings as opposed to mistakes made by the computer. This unusually sophisticated realization – that human beings are the basis of the computer industry – was perhaps the most important trend in the early part of the conference.

Variegated Audience

By lunch, it was clear that human beings differed – as the audience came out from talks given by people such as the president of the Pillsbury company on the importance of management information systems, and the manager of information systems in another company on how to plan them. By and large it seemed that all the different talks were welcomed by many, but bored others. The dividing line appeared to be the computer knowledge level of the audience. Large scale computer users with years of experience were bored by the talks that excited management executives of smaller companies, and vice versa.

Tools Needed First

In the afternoon there were four concurrent sessions with the magnet of management information systems attracting the largest audience. They heard from the giants – Western Electric, The Ford Motor Co., Singer Co., and The First National Bank of Chicago – on how their companies had already faced up to management information systems problems. Particularly interesting to many was the design approach suggested by Warren Welsh, requiring tools to be developed before the user is allowed to specify his needs, and not minding that these needs be satisfied.

This apparent topsy turvy way of doing things was welcomed by many as a refreshing down to earth approach. Members of the audiance later discussed what happens when adequate tools are made available.

Detailed coverage on the rest of the conference, and the papers given will appear in next week's COMPUTERWORLD.

In other sessions they were discussing how the wrong performance of a program costing only $2000 could give rise to damage claims of $560,000.

More Confusion

Graduate Students Now Applying For 'National Security' Jobs

Confusion and uncertainty continue to prevail on college campuses as a result of the recent Selective Service ruling on deferment of graduate students. Confirming a report in a recent issue (CW Feb. 28, p. 1), a new series of COMPUTERWORLD interviews indicates that college seniors and first year graduate students are seriously reevaluating their plans. It also suggests that these young men feel they are more likely to be drafted if they remain in school than if they get jobs related to national security.

Essential Job Deferments

The law states that students now in their first year of graduate school will be allowed up to one more year to obtain a master's degree. Those in their second or subsequent year of graduate school will be allowed a total of five years since the start of their graduate study to obtain a doctorate. Job deferments will be granted at the discretion of local draft boards on the basis of the importance of the job to "community interest." Deferments on jobs essential to "national interest" will no longer be granted.

Many students are making plans on the assumption that there is no difference between "community interest" and "national interest." This assumption is being encouraged by recruiters for some corporations. For instance, Massachusetts will probably interpret "community interest" as meaning the same thing as "national interest," according to Col Paul Feeney, the state's deputy director of Selective Service.

Not Enough Jobs!

There is a danger that too many graduate students will accept job offers, according to a Raytheon representative. The new draft ruling may induce many students to seek jobs with firms having government contracts, he said. In past years, Raytheon has obtained needed personnel by offering about twice as many jobs as it had available. Now there is less certainty about who will be deferred and who will not.

Officials at MIT, Harvard, Georgetown, and other universities expect up to 30% of next year's graduate students to be drafted out of school. MIT's placement office has recently been swamped by students looking for jobs with aerospace and defense related industries. The undergraduates who had planned to go to graduate school before entering the service may now abandon their educational plans. Some will accept full time employment with large corporations and hope to be deferred. Others will volunteer for military service.

In the past, occupational deferments have often been granted to persons classified by their superiors as

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Editorials

NCR & The Century

In our news columns today we are announcing the National Cash Register Century line of computers – or at least the first two of them. In their conservative way, NCR has started with the base of a line, and has not yet gone in for the more romantic areas of multiprogramming and time sharing. This is typical of the company's approach to data processing.

NCR has long been something of an oddity among computer manufacturers. While others have brandished brilliant promises and glittering successes, NCR has largely continued using apparently obsolete equipment. Clearly this was odd – but it was an oddity that has paid off in more ways than one. Their users have experienced remarkably few upsets resulting from computer generation changes. Productivity has grown steadily during the long life of the durable 315s. And NCR management has had the unusual experience of being in control of computer manufacturing – and not letting computer manufacturing be in control of them. The fact that this has paid off is very evident in the announcements about the cost of the new Century line.

This line, they comment, is based on a $150,000,000 investment. It is a large sum of money to any management – but from the viewpoint of major computer manufacturers it must be one of the most inexpensive lines that has ever come out. Still, from the viewpoint of users, the Century appears to be well up to marketing standards of 1968.

If computers are to be reliable for users, then it is necessary that they also be economical for manufacturers. NCR's demonstrated ability to retain management control over the complexity of computer production in 1968 may be odd – but it is a welcome sign of maturity.

Look Out Of the Window

Do you ever look out of your window? Do you notice the change of the seasons, the appearance of the flower shoots with their promise of out-of-doors weather, the return of the birds from warmer climes? Or do you plod away at work all the time, thinking that this is the way ahead?

It isn't, you know – unless your version of getting ahead includes a divorce or two along the way.

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Management's Responsibility | Second Of Four Parts

Where Do They Hide The Body?

By Alan Taylor

In last week's issue of COMPUTERWORLD we discussed the problem of just how much responsibility user management is taking when it installs a computer system. Management must know what the vendor has *really* agreed to supply.

We commented that this is a growing responsibility – and one which was often unappreciated. The lack of appreciation appears to be prevalent even in user and legal circles.

We did mention, however, one instance in which legal attention was paid – in the legal departmetns of the major computer companies. Partly as a result of this legal attention, users needed to exercise good care in reading the proposals. This is because items which add very considerably to a user management's responsibilities are often in quite unexpected places.

Operator Courses

For instance, you wouldn't expect to find user responsibility greatly increased in a chapter of the proposal concerned with how long the computer operator courses are, would you? But that's where it may be. Such a chapter may well start off with an introduction like this:

> "No data processing installation can be any better than the people who run it, and no system will live up to expectations without sound programming and internal policies, efficient operators, good supervision, and normal work flow. That is why training and educational facilities are so important."

It seems innocuous enough; it is placed there quite specifically so that the negative (from the salesman's point of view) aspects are hidden – but it actually increases the user's responsibilities fantastically!

The user, so the theory goes, has now accepted the responsibility to provide:

Sound programming (whatever that means)
Internal policies
Efficient operators
Good supervision
Normal work flow.

Not merely has he accepted these increased responsibilities, but he has also failed to have them defined. What constitute "sound" internal policies? Who says whether the supervision is "good"? All these are left undefined, further weakening the position of the user in an argument with the supplier.

Review Entire Proposal

The lesson to be learned here by user management is that, in the opinion of the supplier, it isn't very crucial where an item goes – only that it appears somewhere. It is not enough to review a proposal in parts. Some of the more important information and qualifications will not always be listed along with the items they can affect. ALL the parts of a proposal should be reviewed as a single entity. (Don't say that this costs too much . . . think of the costs of a computer system that fails!)

Typically, a proposal includes most of the following:

1. Letter of Transmittal
2. Table of Contents
3. Scope of Proposal
4. Advantages
5. Procedures
6. Costs and Savings
7. Personnel
8. Installation Program
9. Manufacturer's Services
10. Agreement for Manufacturer's Machine Service.

Letter Not Just Niceties

The letter of transmittal is often thought to be a letter of introduction to the proposal with niceties and acknowledgments. THIS IS NOT SO. It can be the most important part of the proposal, and very considerable care is given to it.

For instance, it will almost always express appreciation and acknowledgment by name to the user's personnel who have been in contact with the manufacturer. This is not politeness, but buck passing! The phraseology here is intended to show that the user's personnel developed and support the manufacturer's recommendations.

A user, reviewing his proposal, should check carefully that this "support" is not overstated. If it has been, he should ask for the letter of transmittal to be re-written to reflect the facts.

A hastily accepted letter of transmittal may be the source of undesirable repercussions. Subsequent questions about the quality of the manufacturer's service and guidance may result only in accusations that the user's personnel have misrepresented the crucial areas. At the very least, he should obtain a detailed breakdown of the proposal stating which parts are considered to be the responsibility of the user personnel.

Is There a Relationship?

The letter of transmittal often contains another potentially hazardous item. This section purports to explain the relationship between the system described in the proposal and the agreement to be signed by both parties. In fact, there is very little relationship, if any!

Computer suppliers try to differentiate between the roles assigned in the agreement and the systems described in the proposal, at the same time conferring the least possible responsibility on the manufacturer. For this purpose it is obviously better if the manufacturer takes responsibility only for supplying the hardware. That is to say, it is more favorable from his point of view if the agreement for machine services, and not the body of the proposal, is the actual definitive document.

Getting this into the proposal is another of the items that allows a certain amount of freedom. *It is often done in the letter of transmittal.* One phrase that may do the trick is as follows:

> "It is with confidence that we recommend the XYZ as the most profitable answer to your needs. Your signature on the attached agreement will enable us to begin planning immediately for the implementation of your system."

This shows that the agreement – covering only hardware – is the thing. The system that the user wants to implement is not part of any contract. That is his responsibility.

The manufacturer, of course, wants to protect himself against the possibility that the system will not function properly. This is handled by figure qualification in the proposal. There are usually three sets of figures: the volumes of data in the runs; the timing of the runs; and the cost of the equipment. Each of these is carefully qualified so as to protect manufacturer interest.

The volume and record sizes stated in the proposal are often ascribed to user personnel, using the courtesy "thank you for your assistance" style of approach that tends to conceal potential legal effects of the statements.

The timings are somewhat different. They are, after all, the meat of the proposal. They will be carefully studied, worked over, checked out, and will probably form the basis of a decision.

Standard operating procedures have been worked out that prevent this from becoming a major problem. Further details will appear next week.

Letters To The Editor

Not Settled Out of Court

To the Editor:

A friend has called to my attention your article of March 6 on computer contracts. You state that all cases "have been settled out of court." I would like to call to your attention and to the attention of your readers two reported cases which concerned failure of a hardware supplier to deliver under the terms of its contract. The first, decided in 1964, involved a proposal in which the hardware supplier's sales representatives blew their own horn a little too much. For example, they stated, "We have demonstrated to you our complete interest in formulating, planning and assisting in installing a system of tabulating equipment tailored to your needs and your organization's work. Our proposal covers the subject thoroughly, but is only the beginning of applying our experience and know-how to your routines and procedures." Unfortunately, the system did not work as planned, and, after a year and a half of effort to get it working, the buyer rescinded the contract and returned the entire system to the manufacturer. The customer's action was upheld by the court.

In the second case, the Federal Reserve Board contracted for a computer, specifying certain performance features. The successful bidder was unable, after some two years, to perform; the Federal Board cancelled the contract and sued for damages. After lengthy litigation it collected something more than a quarter of a million dollars.

Robert P. Bigelow
Boston, Mass.

Thank you for the information. Could you please send us more details of these cases, as I am sure they will interest our readers. However it appears that they may be irrelevant to our main theme: that the contract, when handled as the manufacturer wants to have it handled, may have implications that user management does not realize. Ed.

Matches Present Unit

Data Transmission Added To Communitype

NEW YORK – A new 6000 character per minute magnetic tape transmission system reportedly will provide off line data sending and receiving facilities for computer operations, and will enable high speed computer magnetic tape to tape data communication over telephone lines. That is the claim made for the T500SR by Communitype Corp.

Communitype Corp.'s new 6000 characters-per-minute magnetic tape transmission system.

Batch and Translate

The system will receive and batch magnetic tape data and translate it to computer compatible codes recorded on computer compatible magnetic tape. It will also send computer prepared data at 1200 bits per second to magnetic tape systems at branch office data processing centers anywhere in the world, according to Robert N. King, president of Communitype.

Bypasses Keypunching

The T500SR unit is designed mainly for use with Communitype's 100SR data communication system. The 100SR incorporates magnetic tape recording and electronic equipment, but is operated by a typist instead of a keypunch operator. The purpose is to bypass the need for keypunched cards.

A T500SR terminal unit at a computer center can serve scores of widely dispersed 100SR installations, King said. The new device reads and writes on computer compatible, seven channel tapes at 556 bits per inch. Its 10½-inch IBM type reels have a capacity of 14,000,000 characters at 556 bpi. First deliveries are expected by April.

New Cobol Ideas For Data Bases Pushed

MONROEVILLE, PENNA. – How to alter Cobol so that it provides for data base management was the subject of a report published this week by Codasyl (The Cobol Committee of the Conference on Data Systems Language).

The report as yet has no official backing but is offered for consideration and comment. It recommends that a new section be added to Cobol that allows files to be defined using the "circular chain" or "ring" method, the widest possible utilization of actual storage. It also recommends that new Cobol statements be added to handle normal updating methods (store, update, delete, etc.).

The circular chain method recommended by the committee has been in operation since 1963 on General Electric machines. It also is used by General Motors as part of their in house software.

In a ring structure, lists are circular in that the tail of any list leads back to its head rather than containing an indicator to show that it is the last record on the list. The records in a ring may be placed in sequence or not. They can be retrieved by direct access methods. Accessing can be handled by multiple keys in an efficient manner, and the record size tends to be small.

Particular advantages claimed for the ring method are that the record size is kept down and that access via multiple keys is possible in an efficient manner. The report also says that the programmer, using this method, is not required to express the logical relationships between the records in the form of detailed procedures, as is needed with a number of other approaches.

Major Recommendations of Codasyl's Data Base Task Group

A. Add or extend Cobol statements to provide functions which:
   1. Store records on mass storage devices in an increased variety of forms which more nearly model the actual use or relationship of one record to another. Some typical structures are trees, hierarchies or networks.
   2. Find records in the structure with a minimum of procedural effort.
   3. Insert records which are members of defined structures.
   4. Remove records from structures which are members of the structure.
   5. Modify the content of records in a structure and cause any required restructuring which the modification may imply (remove the necessity for sorting or merging to accomplish the restructuring).
   6. Delete records in a variety of data structures as above.

B. Add facility for declaring master and detail record relationships which use circular chains as a means to provide the widest possible file structuring capability. Use a separate section to define these relationships to avoid a significant change to existing Cobol Source Program rules.

C. Other goals discussed included storing data and structure description with the data, data protection and storage space management. These items are being recommended for consideration as long range goals.

The report supports the recommendation by first considering the several modes of interaction with a data base, and then discussing the data management techniques currently used to solve the programming problem. After a comparison of known data organization and accessing techniques, the conclusions in favor of the circular chain or ring structure are presented. This is further fortified by examples showing how a ring structure can be used to accomplish any of the other structures previously discussed. A brief functional description of necessary extensions for data and procedures is presented.

The major recommendations of the report are shown above. Requests for copies, as well as comments, can be sent to the task group chairman, Warren G. Simmonds, United States Steel Corp., P.O. Box 124, Monroeville, Penna. 15146.

Another Company Will Make User Terminals

MINNEAPOLIS – Avnet, Inc., New York based manufacturer of electrical and electronics-oriented products, has entered the computer industry with the formation of a new division called Diversified Numeric Applications (DNA). DNA will concentrate on using applied computer technology in applications which involve man's interaction with computers in everyday life. The division will provide both standard and custom designed products and systems, as well as supporting services.

Neil I. Fishman

Low Cost Terminals for All Systems

Among DNA's first products will be a line of low priced, remote input/output terminals capable of communicating with any manufacturer's computers over a variety of standard communication channels. DNA will also design, assemble, program, and install total systems involving low cost, general purpose digital computers with application-oriented communication and analog/digital hardware.

Last week another new company, Viatron, announced that it will manufacture a line of low cost digital data processing, entry and display equipment compatible with all standard computer systems. (See CW, March 6, p. 3.)

Neil I. Fishman, formerly product manager, real time systems, for the digital control systems division of Control Data Corp., has been named president of DNA. Other officers include: James H. Baker, Michael J. Selner, and Robert A. Fallat.

What Is '90% Of US Needs'?

Ampex Guesses Size Of Contract

REDWOOD CITY, CALIF. – Ampex Corp. announced that it will sell about $8 million worth of magnetic computer tape to federal agencies, under a big new government contract. The announcement confirmed a report in COMPUTERWORLD (Feb. 7, p. 1) that Ampex contracted to supply up to 600,000 reels of tape to the government, at $12-14 per reel. Those prices are 40% less than prices previously paid by the General Services Administration (GSA) for magnetic tape.

The contract is the first of its kind under a new system for centralized purchasing of computer equipment and supplies. Ampex will now provide about 90% of all computer tape used by U.S. government owned corporations and executive agencies. The contract was awarded by the procurement operations division of GSA's supply service.

New federal procedures require that orders in excess of $50,000 go out for competitive bids, as the Ampex contract did. Smaller individual orders may be handled centrally. Savings created by the new procedures are expected by GSA to be about equal to savings created by the relatively low prices of Ampex tape.

Ampex is one of the first independent suppliers of tape. It is one of the few manufacturers whose tape is not sold under more than one name. Most computer tape firms sell their tape to wholesalers for repackaging.

At the same time, 3M Corp. got a one year contract to supply up to 80,000 reels of tape to the federal government.

GSA is expected to step up its efforts to cut EDP costs, because of the success of new procurement procedures. Use of plug to plug compatible peripherals is being considered.

Computers Have To Think 'Square' To Get Carpets

The computer room of the new 26-story Houston Natural Gas Building features wall to wall carpeting composed of three-foot squares cemented to lift out metal floor panels. The unusual floor construction is necessary to provide ready access to the intricate wiring system below. The nylon carpeting, Nu Nyl by Seamloc Loma-Loom, was selected primarily for acoustical control. Comfort, aesthetics, and ease of maintenance were other considerations. The tightly woven, sponge bonded carpet is one that meets performance criteria established by Allied Chemical Corp. for its three year Allied Chemical engineered nylon surface-wear guarantee for commercial carpets.

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Analog Man Tapped By McDonnell To Head Time-Sharing

Donald C. Augustin

ST. LOUIS – McDonnell Automation has taken an analog man, Donald C. Augustin, rather than a batch processor, to head their direct access computing operations.

Direct access computing is the time-shared computer service announced last month by McDonnell Automation Company, a division of McDonnell Douglas Corporation. Augustin will direct this service, which provides to businessmen, professionals and industry the desk-side computing capabilities of direct access computing.

Company president W.R. Orthwein, Jr. commented: "The increasing use of time sharing computers, such as the General Electric 420 system operated by McDonnell Automation Company, points to the economy and convenience that direct access computing can provide. It is an economical, easy-to-use solution to the computing needs of many small-to-medium size businesses. It also has multiple applications in large organizations."

Augustin started with McDonnell in 1950, and has served most recently as section manager, analog/hybrid department. The Mercury and Gemini astronauts received training on simulators run by Augustin's department.

Design Magazine Selects H-8200 Console For Show

NEW YORK – Designs of two computer products have been selected for exhibition in Brooklyn, N.Y. and Ljubljana, Yugoslavia. Chosen for exhibition were the console of Honeywell's large scale H-8200 computer and the Honeywell Data Station, a multipurpose remote terminal device.

The H-8200 console was exhibited from February 6 through 25 at the Brooklyn Museum. The exhibit was part of the 14th annual design review sponsored by **Industrial Design Magazine**. The design was chosen from more than 1000 entries, and was created by John F. Graham, John Bachman, Channing Morrison, and Dominic Tamano, Honeywell EDP's design team.

John Graham, who is supervisor of industrial design at Honeywell EDP, also designed the data station which will be exhibited April 19 through May 26 at the Third Biennial of Industrial Design in Ljubljana. The American entries were selected by the Industrial Designers Society of America, a society representing about 600 industrial designers who have met high standards of professional capability.

It May Not Be For You, But . . .

ICT-1901A — A Best-Seller?

The ICT 1901A is a system which is not being sold in the U.S., but is important to all American EDP managers who may have to advise head offices or subsidiaries about the relative advantages of possible overseas computer purchases.

When a non-American company is considering going into computers for the first time, they will naturally consider many of the computers familiar to American users – such as the IBM 360/25 and the Spectra 70/35 (or its relatives) – and probably the newly announced 1901A.

When ICT first introduced their 1900 line in 1964, it was thought of as being a stop-gap, but now it is recognized as being the most successful series of computers ever designed outside the U.S. Business oriented systems, as well as scientific models are available, and the top of the range is on a par with the 360/75.

With the introduction this year of the "A" versions of the three lowest systems (the 1901, 2, and 3) a continuing life has been brought into the series.

Here are the technical details of the smallest system – the 1901A.

The I.C.T. 1901A central processor is the basis of a general purpose computer system that has been designed to provide high power data processing facilities at a relatively low cost. The 1901A is suitable for commercial or scientific applications, or for a mixture of these. A feature of the system is a new device, the Twin Exchangeable Disk Store (known as *twin disk*), that brings the considerable advantages of direct access processing within the reach of smaller computer users.

The 1901A is compatible with the other computers in the I.C.T. 1900 series, and any programs written for it may be run on any other processor in the range with a suitable configuration.

The core store has 4K, 8K or 16K 24 bit words. Besides the twin disk, special punched card readers and line printers have been developed by I.C.T. for use with the 1901A. A wide selection is also available from I.C.T.'s range of 1900 series *standard interface* peripherals, providing system flexibility.

Twin Exchangeable Disk Store

The new Twin Exchangeable-Disk Store, which is functionally like a 2311, is made by Control Data. It comprises two disk cartridges mounted on a transport unit consisting of a drive mechanism and read/write heads. Each cartridge contains two disks and data is recorded in concentric tracks around the surfaces of these disks. The combined capacity of both cartridges on the I.C.T. 2820 twin disk is over 1.6 million characters and on the 2821 it is nearly 3.3 million characters. Head movement time varies from 30 to 150 msec., and average latency is 125 msec. There are four read/write heads on a transport, one for each disk.

The 2404 and 2405 Line Printers can print up to 300 and 600 lines a minute respectively, each line containing up to 120 characters.

Standard Interface Peripherals

The I.C.T. standard interface, which is represented physically by a single multi-pin plug and socket, provides a standardized mode of connection between central processors and peripherals in the 1900 series. A standard interface peripheral may be attached via any standard interface channel to any 1900 series processor for which it is approved.

The peripherals that may be attached to a 1901A central processor are shown below:

1901A peripherals

2820 Twin Exchangeable Disk Store
(capacity 1,638 million characters, transfer rate 208,000 characters a second)

2821 Twin Exchangeable Disk Store
(capacity 3.276 million characters, transfer rate 208,000 characters a second)

2105/1 80-column Card Reader (300 cards a minute)

2106/1 80-column Card Reader (600 cards a minute)

2404 Line Printer (300 lines a minute)

2405 Line Printer (600 lines a minute)

Standard interface peripherals

2801 Exchangeable Disk Store
(capacity 4.096 million characters, transfer rate 208,000 characters a second)

2802 Exchangeable Disk Store
(capacity 8.192 million characters, transfer rate 208,000 characters a second)

1917 Magnetic Tape System (transfer rate 20,000 characters a second)

2101 80-column Card Reader (1600 cards a minute)

1920 80-column Card Punch (100 cards a minute)

2102 80-column Card Reader
(300 cards a minute; available only for systems without backing storage)

2103 40-column Card Reader (600 cards a minute)

1915/2 Paper Tape Reader (300 characters a second)

2601/2 Paper Tape Reader/Punch
(reading 300 characters a second, punching 110 characters a second)

2602/2 Paper Tape Reader/Punch
(reading 1000 characters a second, punching 110 characters a second)

1933 Line Printer (1350 lines a minute)

1934 Digital Incremental Plotter (Graph Plotter)

7071 Teletypewriter and 7070/2 Data Terminal

7010/3 Telephone Data Terminal

7201 1004 Data Processor Link

Executive

The Executive control program is the basic operating system of the 1900 series and it is always present in the lower end of the core store of 1900 series computers. Executive controls the loading and running of programs, the allocation of peripherals to programs and the organization of data transfers between peripherals and processor.

Certain of the order code instructions on the 1901A are not performed by hardware (as they might be on a more powerful 1900) but by Executive subroutines known as extracodes. Using this technique, the 1901A order code is made as comprehensive as that of larger 1900 series computers.

On a 1901A with twin disk or E.D.S., only part of Executive is held permanently in core store; the rest is held on disk and selected parts are overlaid into core store when required. The permanent part of Executive contains the most frequently used routines, to minimize the need for overlaying. This technique ensures that the maximum possible area of core store is left free for user programs.

Operator communication on a 1901A computer with backing storage is through a console typewriter. Messages to and from Executive (and the user program) are typed out on this console in a form of abbreviated English. In an installation without backing storage, operator communication is by means of a set of handkeys and neon lamps.

Automatic Operator

matic Operator provides an extension to the facilities of Executive, enabling action to be taken without the intervention of the human operator in response to messages generated by Executive and object programs. Provided that the sequence of halts likely to occur during a program run can be accurately predicted, use of Automatic Operator can make restart procedures more or less completely automatic, shortening program running time.

The action to be taken with regard to halts is defined by means of control messages that are punched into cards or paper tape and interspersed with the input data for the run to which they refer. Automatic Operator is activated by a control message that specifies the anticipated console message which will be typed at the next halt. If this anticipated message is eventually typed, Automatic Operator reads the next control message and obeys the directive that it contains.

The next anticipated console message can then be specified, and the process continues until the run ends and the program is deleted. Another program can then be automatically loaded and run, and the cycle can continue. If ever a program event occurs that has not been catered for with a control message, Automatic Operator is switched off and the human operator takes over.

Plan Assembler

Plan is the basic programming language for I.C.T. 1900 series computers. Plan uses the 1900 order code directly, with the added facility of writing functions in easily-comprehended mnemonic form.

There are three types of Plan compilers, for programs written in Plan 1, 2 or 3. Plan 1 requires only a 4K core store but the most comprehensive and powerful form of the language, Plan 3, requires a 1901A with a core store of at least 8K words.

Nicol

Nicol is a commercial programming language specially developed for smaller computers in the 1900 series. It has been designed particularly for 4K processors without backing storage, but can be used in larger installations. The features of this language, which is very easily learned, bear a close resemblance to the facilities offered by a tabulator, and Nicol is thus particularly suitable for data processing installations changing over from a tabulator to a computer.

Cobol and Compact Cobol

The I.C.T. full Cobol compiler requires 16K of core store. 8K 1901A users can still write programs in Cobol, however, because of the availability of a Compact Cobol compiler. Compact Cobol is a subset of the full language which offers a smaller range of programming facilities.

Fortran and Basic Fortran

Full Fortran facilities are provided by a compiler which requires a 16K core store. A subset of the full Fortran facilities is provided by a Basic Fortran compiler which runs on smaller machines.

Algol and Basic Algol

I.C.T. provides compilers that translate Algol statements into machine instructions, so that the procedures described in the statements can be implemented on a 1900 series computer. The full Algol compiler requires a 16K core store but a subset of the full facilities is provided by a Basic Algol compiler that can be run on smaller machines.

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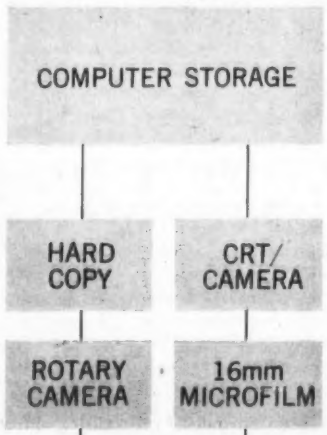

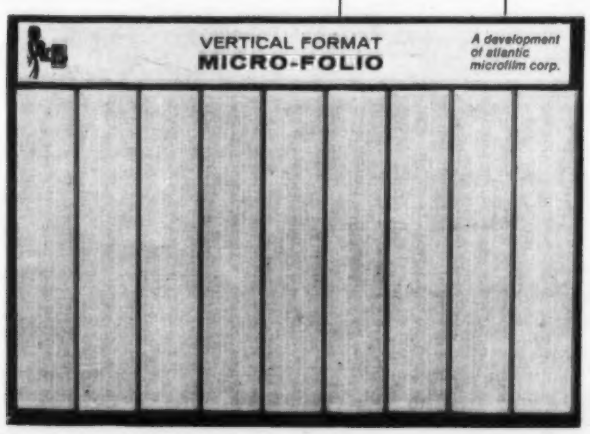

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Auerbach Gets $55K Evaluation

The *Department of Labor, Bureau of Employment Security*, has awarded *Auerbach Corp.* a $55,300 contract to develop an evaluation instrument for analyzing the effectiveness of the Human Resources Development (HRD) program.

The contract calls for determination of the effectiveness of HRD functions including seeking out individuals with employment problems, improving employability, developing job opportunities and placement services, and providing job market information.

The Human Resources Development concept is being applied to pilot projects in Los Angeles, Chicago, Houston, Rochester, and St. Louis. Auerbach is studying each of these pilot projects to structure an evaluation instrument for future HRD efforts.

The *Douglas Aircraft Co.* has filed a letter of intent with *IBM* for two System 360/85s. Douglas will use the high speed capability of the computers, scheduled for delivery within two years, in its aircraft, missile, and space programs. The company expects the new computers will enable them to process data five times faster than is now possible with its 360/65 models and ten times faster than with its 7094s.

Byron-Jackson, Inc., a division of Borg Warner Corp., is installing a *Univac* 9200 high speed computer for its business operations in Houston.

Orders and Installations

Midland Bank Ltd. of Great Britain has purchased two *Burroughs* B6500 systems for a nationwide automated on line banking system. The systems, valued at $12 million, will be located at the bank's regional data processing centers in Liverpool and London, and will be linked to 1850 Burroughs TC-500 terminal computers at branches throughout England and Wales.

Data Products Corp., manufacturer of peripheral equipment, has received a $1,442,000 contract from the *U.S. Naval Ship Systems Command* for high speed military line/printers to be used in shipboard and land-based installations. The printer is an advanced version of printers now used in military applications, and is the result of three years of design and development work with the Navy.

General Dynamics has awarded a lease contract to *Honeywell's EDP Division* for an administrative switching system to handle the corporation's written-wire message traffic here and overseas. The Model 200 system is scheduled for operation in July.

Programming Sciences Corp., Washington, D.C. will be awarded a contract to study the feasibility of locating a regional data center in the *LENOWISCO district of southwestern Virginia.* The district is comprised of the counties of Lee, Scott, and Wise, and the City of Norton.

The *Department of Labor* has awarded *Planning Research Corp.*, Los Angeles, a $149,000 contract for continued cost-benefit analysis support of the Manpower Administration.

Univac has received a $6.3 million order to supply computer equipment to the *Swiss Postal, Telephone and Telegraph Service.* Three Univac 418 computers will form the heart of the system, scheduled for installation in March.

Rutgers University has ordered two *SDS* computers, a Sigma 2 and a Sigma 5, for studies in nuclear structure physics. The university will use the $500,000 dual computer system to study the composition of atomic nuclei and the forces which hold these nuclei together. The computers will be used in conjunction with a tandem van de Graaff accelerator, which accelerates nuclei of light atoms to high energy where they strike the nuclei of the substance under study. The resultant radiations and their energies are measured and analyzed by the computer system.

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Rockwell Adds 2 To Systems

Bradley

Paul E. Bradley and **John G. Pascotto** have joined the corporate order system development group at *Rockwell Manufacturing Co.*, Pittsburgh. Bradley is a computer systems analyst, and Pascotto, a programmer.

Donald B. Nowakoski has been named general manager of the Washington Military Systems Division of *Control Data Corp.*

John F. Horton has been appointed general manager of the America Group of *Univac's International Division.*

Col. Spencer S. Hunn, vice commander of the *Air Force Electronic Systems Division,* has been nominated by President Johnson for promotion to brigadier general. Before the promotion takes effect, the nomination must be confirmed by Congress.

Henry Duszak has been appointed manager of product marketing for *RCA Information Systems Division.* He was the division's district manager in Newark, N.J.

Richard H. Lussier has been named branch manager of the Boston sales office of *Honeywell EDP.*

Klein

Edwin E. Klein has joined Brandon Applied Systems, Inc. as director of professional services – New York.

Harrison J. Martell has been appointed manager of engineering and manufacturing operations for the new *RCA* information systems division plant to be constructed in Marlboro, Mass.

William O. Bellows, president of the Western Massachusetts chapter of the DPMS, has been named a senior consultant at *Computer Results Corp.*

Newspaper Applications Aimed At By Copley Press Service Bureau

SAN DIEGO, CALIF. – A new national service bureau has been formed to specialize in newspaper support applications ranging from business office data processing to newspaper production systems. Copley Communications Services, Inc. (CCSI) has started using an RCA Spectra 70/45 that communicates with a Univac 9200, IBM 1050, and Dataspeed II. An IBM 1130, 1401, and 1440 are also in use at CCSI.

Programs have been developed to process market research, sales analysis, and various sorts of accounts and statistics. Programs for newspaper production systems include typesetting – and photocomposition for Linofilm and Photon 560 or 713.

Spectra "Calculated Risk"

CCSI intends to provide on-line information storage and retrieval, according to John McBride, bureau president. He said the bureau had considered an IBM 360/40, but finally chose RCA's Spectra 70/45 as "a calculated risk that RCA will be more active in supporting developments in our field of interest." McBride said, "One of our major considerations was the computer manufacturer's support in software and hardware development for graphic arts."

John McBride, President of New CCSI

CCSI maintains a 24 hour per day, seven day per week schedule, and is able to accommodate continuous processing requirements. In addition to software design and development, computer time is available for customer use.

Mark IV Users To Go Formal In May

LOS ANGELES – Eighty seven persons, representing 40 firms, attended the two day Meeting III of the IV League. Plans were made for Meeting IV to be held in Washington, D.C. on May 13 - 14, when formal organization matters will be discussed.

The IV League is an organization formed by users of Informatics' Mark IV File Management System, the general purpose software product for business data processing on IBM System/360 computers.

Bob Benjamin of National Dairy Products Corp., chaired the sessions which included presentations on operating experience and applications of Mark IV.

Representatives of Informatics reported on the progress of the system, various technical aspects and briefly discussed system enhancements.

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Hardware

HAWTHORNE, CALIF. – *Electronic Memories, Inc.* reported sales totaling $21,172,916 in 1967. This figure includes the results of Anadex Instruments and Wems, Inc., which were acquired by EMI in 1967, and reflects a 25% increase over the 1966 volume of $16,988,558. Net income for the year was $1,155,321, up 60% from the $723,140 earned in 1966. Earnings per share in 1967, based on an average ,,129,644 shares outstanding, were $1.02. This compared with $.67 earned in 1966 on 1,074,796.

Main Frame

NEW YORK – *RCA* sales and earnings set new records in 1967 for the sixth consecutive year (See CW, Jan. 17, p. 8). Profits after taxes were $147,509,000, a rise of 2% over the previous record of $144,459,000, in 1966. Sales were $3,027,216,000, an increase of 5% over the 1966 total of $2,891,975,000. Earnings per common share were $2.27 as compared with $2.26 in 1966 when fewer shares were outstanding. The fourth quarter of 1967 was the best single profit quarter in RCA's history.

Software and Services

WASHINGTON, D.C. – *Aries Corp.* reported an increase of 36% in revenues for the year ended Dec. 31, 1967. However, an investment in office and network expansion and proprietary computer programming caused an operating deficit for the year, the company announced. Revenues totaled a record $4,351,636, as compared with $3,198,158 in 1966. The company's net loss was $131,039 for 1967, as compared to a profit of $142,824 in the previous year. The per share loss was $.42, compared to earnings of $.50 in 1966.

Company president Richard P. Daly said major factors affecting profitability in 1967 were: the cost of starting up offices in Chicago, Philadelphia, and Atlanta; continued start up costs of facilities at the Broadway, Va. subsidiary, and the educational systems division in Washington, D.C.; delays in Congressional approval of federal agency appropriations; and a major investment in research and development work to build an inventory of proprietary programming packages. Daly termed the deficit a "temporary sacrifice of current profitability." He said the steps taken will expand Aries' capabilities to profitably handle a larger volume of business. He pointed out that the firm has substantially reduced its 90% dependence on government work and diversified into software for space sciences, library sciences, banks, education, airlines, financial management, and communications systems. The year's efforts also produced proprietary program packages that Aries is now marketing, including the Auto Diagrammer system.

Others

PHOENIX – Wabash Magnetics, Inc. has completed acquisition of *Peripherals Inc.*, manufacturer of equipment for certifying computer memory disks. The transaction was accomplished with 300,000 shares of a new issue of Wabash convertible preferred stock. No changes are planned except continued expansion of Peripherals' Phoenix operation.

Computer Stocks: Trading Summary

Week Ending March 1, 1968

NEW YORK STOCK EXCHANGE	1967 High	1967 Low	Week High	Week Low	Last	Week Net Change	Week %Change
Addressograph-Multigraph	80 1/2	46 7/8	63 7/8	58 1/8	58 3/8	- 5 1/4	- 8.25
American Research	195	37 3/4	145	129 1/2	136	- 1 3/4	- 1.27
Ampex Corp.	40 3/4	22 3/4	30 1/2	29	29	- 1 3/8	- 4.53
Burroughs	198 5/8	80 7/8	184 1/2	162 5/8	163 3/8	- 19 7/8	- 10.80
Collins Radio	114 7/8	53	71 1/2	65 5/8	67 3/4	- 3 1/4	- 4.58
Control Data	165 5/8	33 1/2	119 5/8	99	101 1/2	- 17 1/4	- 14.53
Electronic Associates	30 1/4	16 3/4	23 3/8	19	19 1/8	- 3	- 14.20
General Electric	115 7/8	82 1/2	88 1/4	86	87 1/4	. . . .	. . . .
Honeywell	117 7/8	63 1/2	98 3/4	93	93 1/8	- 4 1/2	- 4.61
IBM	648	362 1/2	596 1/2	576 1/2	577	- 12 3/4	- 2.16
Litton	120 3/8	63 1/8	69 1/8	63 1/8	63 3/4	- 5	- 7.27
Nat Cash Register	136 5/8	67 1/8	112	103 3/4	103 7/8	- 8 1/4	- 7.34
RCA	134	107 1/4	109 3/4	107 7/8	109	+ 1/2	+ 0.46
Raytheon	117	49	84	77 1/4	78 1/4	- 5	- 6.01
Sanders	77 1/4	37 5/8	49 3/4	45 1/8	46 1/8	- 2 1/8	- 4.23
Scientific Data	152 3/4	70 3/8	131	116 1/8	118 1/8	- 9 3/8	- 7.35
SCM	82 1/4	42	45 5/8	42	42	- 3 1/4	- 7.18
Sperry Rand	65 1/8	28 1/8	49 3/4	44 1/2	45	- 3 5/8	- 7.46
NYSE COMPUTER STOCK AVERAGE						- 5.84	- 6.18

AMERICAN STOCK EXCHANGE	1967 High	1967 Low	Week High	Week Low	Last	Week Net Change	Week %Change
Automatic Data Processing	68 1/2	41 1/2	52 1/4	46 3/4	47	- 5 1/2	- 10.48
Bunker Ramo	21 7/8	7 1/2	15	13 1/2	13 1/2	- 3/4	- 5.26
Calcomp	46 3/4	32	34 1/2	32	32 1/8	- 2 1/4	- 6.55
Computer Applications	47 3/8	14	25 3/4	22 1/4	22 7/8	- 2 1/2	- 9.85
Computer Sciences	67 5/8	18	45 3/8	40	40	- 3 7/8	- 8.83
Digital Equipment Corp.	156	29 3/8	115 1/2	99 3/4	102	- 9	- 8.11
GC Computer Corp.	41	23 1/4	30 3/8	28 5/8	28 3/4	- 1 1/2	- 4.96
Leasco	146 1/4	33 5/6	109 3/4	95 1/2	98	- 11	- 10.09
Levin-Townsend Computer Corp.	77	10 7/8	52 1/2	44 5/8	45 7/8	- 6	- 11.57
Milgo Electronics	23 1/8	5 1/8	18 3/8	16 1/4	16 7/8	- 1 1/4	- 6.90
Mohawk Data Sciences	198 1/2	108	126 1/4	114	115 1/8	- 4 5/8	- 3.86
Planning Research	51	27 5/8	34	31	31	- 2 1/4	- 2.77
Potter Instrument	40 1/2	12 3/8	27 1/2	23 1/2	25 5/8	- 5/8	- 2.38
Randolph Computer Corp.	55 3/4	32 1/4	42 1/4	37 1/2	38	- 2 3/4	- 6.75
AMSE COMPUTER STOCK AVERAGE						- 3.85	- 7.31

OVER-THE-COUNTER	1967 High Bid	1967 Low Bid	Friday Bid	Friday Asked	Last Friday Bid	Week Net Change Bid	Week % Change Bid
Applied Data Research	30	3 1/8	26	28	25	+ 1	+ 4.00
Bolt, Beranek & Newman, Inc.	30	8 1/4	17 1/4	18 1/4	19 3/4	- 2 1/4	- 11.39
Computer Usage	72	20 1/4	39	40 1/2	43	- 4	- 9.30
Cyber-Tronics	19	4 3/4	12 1/4	13 3/4	14 1/4	- 2	- 13.79
Data Products	23 3/8	2 1/2	15 1/4	15 5/8	16 3/4	- 1 1/2	- 8.96
Digitronics	27 1/2	6	19 1/4	20 1/4	20	- 3/4	- 3.75
DPA, Inc.	17 3/4	4 1/4	13 1/4	13 3/4	14 1/2	- 1 1/4	- 8.67
Electronic Memories	57 1/2	12 3/4	39	40 1/2	43 1/2	- 4 1/2	- 10.34
Fabri-Tek	15 3/4	6	10	10 1/2	11 1/8	- 1 1/8	- 10.11
Informatics	59 1/2	7 1/2	35	37	41	- 6	- 14.63
LMC Data, Inc.	16	7 3/8	10 1/2	11	11 1/4	- 3/4	- 6.67
Management Assistance	24 3/8	10 1/8	10 7/8	11 1/4	12	- 1 1/8	- 9.38
Memorex	67 1/4	58	58	60	63 1/2	- 3 1/2	- 8.66
Optical Scanning Corp.	102	25 3/4	74	77	77	- 3	- 3.90
Recognition Equipment Corp.	45 1/2	38 1/2	40 1/4	41 1/4	45 1/2	- 5 1/4	- 11.54
Systems Engineering Labs	63 1/4	8 7/8	10 1/4	11	11 1/4	- 1	- 8.89
University Computing Co.	95	63	63	65	65	- 2	- 3.08

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NCR Century Is Shown

(continued from page 1)

the programmer and the Century series. Fixed format statements add to simplicity by regimenting the coding without reducing the capability of the language.

Special Features

A symbolic (source code) debugging system is available for both Neat/3 and Cobol which allows the programmer to check his own logic out using the same language in which he programmed his application. This feature will save training and debugging time.

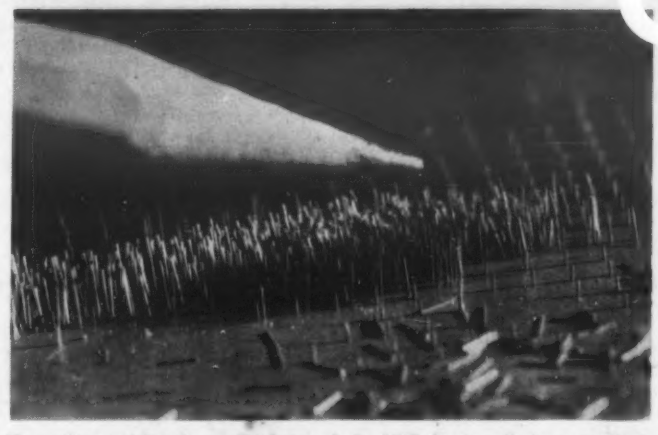
The operating system provides automatic scheduling of the Century's workload, protection of all files, the proper transmission of all information, and the efficient use of the hardware's inherent simultaniety.

The scheduling facility allows programs to be loaded and executed conditionally. These conditions are based on calendar date information or on the data being processed itself. For example, particular programs may be set up to run on the last operational day of the week; sort programs may be skipped if data is already in sequence.

A daily log that keeps track of every operational milestone is another feature incorporated in all members for proper audit control.

Capability and Simplicity

"The design of this entire software system was influenced heavily by the true needs of today's business world," said William Keating, NCR's director of software. "Close liaison with many operating installations, and our own experience with first time users enabled us to achieve a delicate balance between capability and simplicity. Our customers will be able to apply the Century quickly, efficiently, economically...according to schedule. Our software is on time."



These tiny metal rods are the heart of the NCR Century Series computer's memory. The rods, only a tenth of an inch long, replace conventional magnetic cores. Easily fabricated and assembled, the rods are literally "danced" into centers of minute solenoids when placed in a pulsating magnetic field. Rods are cut from a continuous strand of wire plated with thin-film magnetic material.

Cram Has 30 X More Capacity

NCR introduced the first magnetic card memory in 1961 and since then has installed over 1500 units. The new version of Cram offers 30 times the capacity of the original at approximately the same monthly rental and its access time is now down to near normal disk pack timings!

This new Cram has a capacity of 125 million bytes of information stored on each interchangeable cartridge of magnetic coated plastic cards. Access time capabilities have been improved significantly. Average access time on the original Cram unit was 225 msec (thousandths of a second), while access time on the new unit is 125 msec. Access time is shared between units in a multiple Cram installation.

Read After Write Check

Unique among direct access memories, Cram has a built in automatic read after write check. This check is performed concurrently with writing and requires no additional system time. Other advantages of the Cram units include its ability to store multiple small files on one deck of cards and the ability to use a Cram unit for both random and sequential processing.

A number of specialized industrial programs are available. Details will be given next week in COMPUTERWORLD.

Students Seek Security Jobs

(continued from page 1)

essential personnel. IBM at Poughkeepsie, N.Y., for example, has usually been able to get deferments for personnel whose work is important to the company and relevant to "national interest." IBM never found it necessary to define "national interest" in terms of national security or defense. General Foods, Proctor & Gamble, and similar companies have obtained deferments for their essential personnel on grounds of "national interest."

Disruption of graduate students' plans is expected to hamper development of projects run jointly by industry and universities. The computer aided design project at MIT, for example, is sponsored by Research Laboratories, United Aircraft, and other firms with much of the work being done by graduate students.

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